

Amblyopia

WHAT IS AMBLYOPIA?

Amblyopia is decreased vision in one or both eyes due to abnormal vision development in infancy or childhood. In the first few years of life, the brain must learn to see or interpret the images provided by the eyes. In amblyopia, the brain receives a poor image from the eye and thus does not “learn to see well [See Figure 1]. Vision loss occurs in this case because nerve pathways between the brain and the eye are not properly stimulated.

In amblyopia, there may not be an obvious problem of the eye. Another word for amblyopia is often “[lazy eye](#).” It is the leading cause of vision loss amongst children].

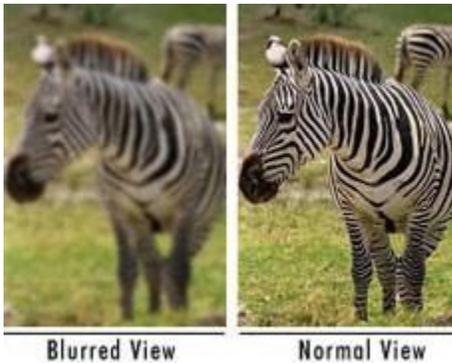


Fig. 1: Amblyopia occurs in childhood when an eye gives a blurry or otherwise poor image to the brain that impairs the brain’s ability to learn to see.

WHAT CAUSES AMBLYOPIA?

Normal vision develops during the first few years of life. At birth, infants have very poor vision. As infants grow and use their eyes, the vision improves as the vision centers in the brain develop. If children are not able to use their eyes, the vision centers in the brain do not develop properly and the vision is decreased. Amblyopia may occur despite normal appearance of the eye structures.

The most common cause is refractive error in one or both eyes that is not corrected early in childhood resulting in poor development of the visual function in the affected eye(s). This is called refractive amblyopia. Another common cause is strabismus or eye misalignment. This is called strabismic amblyopia. Rarely there is a structural anomaly that impairs vision like a droopy eyelid or an opacity in the eye, such as a [cataract](#) or corneal scar. This is called deprivation amblyopia.

The three types of amblyopia, strabismic amblyopia, refractive amblyopia, and deprivation amblyopia, may occur at the same time in a single eye.

WHAT IS STRABISMIC AMBLYOPIA?

Strabismic amblyopia develops when the eyes are not straight. One eye may turn in, out, up or down. When this happens, the brain begins to ignore, or “turns off” the eye that is not straight and the vision subsequently drops in that eye.

WHAT IS DEPRIVATION AMBLYOPIA?

Deprivation amblyopia develops when cataracts or similar conditions “deprive” young children’s eyes of visual experience. If not treated very early, these children never learn to see very well and can have very poor vision. Sometimes this kind of amblyopia can affect both eyes.

WHAT IS REFRACTIVE AMBLYOPIA?

Refractive amblyopia happens when there is a large or unequal amount of [refractive error](#) (glasses strength) between a child's eyes. The brain does not learn how to see well from an eye that has a great need for glasses. The child may see well from one eye that has less of a glasses need compared to the other eye. The vision problem may not be detected because the child does not complain of blurry vision. In addition, the amblyopic eye may not look any different from the better seeing eye. Therefore, parents and pediatricians may not realize there is a problem. For these reasons, this kind of amblyopia in children may not be found until the child has a vision test. This kind of amblyopia can affect one or both eyes and can be best helped if the problem is found early.

WILL GLASSES HELP A CHILD WITH AMBLYOPIA TO SEE BETTER?

Glasses may be effective in treating some types of refractive amblyopia and strabismic amblyopia (such as [accommodative esotropia](#)). For many children, the amblyopia or poor vision may also be treated by penalizing the better seeing eye by patching it or using blurring eye drops (atropine). Penalizing the better seeing eye forces the brain to pay attention to the image coming from the weaker eye, prompting the brain to learn to see better from the weaker eye.

WHAT CAN BE DONE IF MY CHILD HAS EQUAL HIGH AMOUNTS OF FARSIGHTEDNESS AND/OR ASTIGMATISM AND IS DIAGNOSED WITH BILATERAL AMBLYOPIA?

Bilateral amblyopia is usually treated with consistent, early glasses, and/or contact lenses with follow-up over a long period of time. If asymmetric amblyopia (one eye better than the other) occurs, then patching or eye drops may be added.

WHEN SHOULD AMBLYOPIA BE TREATED?

Early treatment is always best. If necessary, children with refractive errors (nearsightedness, farsightedness or [astigmatism](#)) can wear glasses or contact lenses when they are as young as one week old. Children with cataracts or other "amblyogenic" conditions are usually treated promptly in order to minimize the development of amblyopia.

HOW OLD IS TOO OLD FOR AMBLYOPIA TREATMENT?

A recent National Institutes of Health (NIH) study confirmed that some improvement in vision can be attained with amblyopia therapy initiated in younger teenagers (through age 14 years). Better treatment success is achieved when treatment starts early, however.

HOW CAN I GET EARLY TREATMENT FOR AMBLYOPIA?

Some forms of amblyopia, such as that associated with large-deviation [strabismus](#), may be easily detected by parents. Other types of amblyopia (such as from high refractive error) might cause a child to move very close to objects or squint his or her eyes. Still other forms of amblyopia may not be obvious to parents and therefore must be detected by vision screening.

WHAT IS VISION SCREENING?

Vision Screening is recommended by the American Academy of Pediatrics (AAP) to detect amblyopia early enough to allow for successful treatment. Pediatricians check newborns to find cataracts or other congenital problems. Infants are checked for the ability to fix and follow and for strabismus (eye misalignment). Electronic instruments may be used to identify refractive error or amblyopia in toddlers. Once children can consistently identify objects either by reading or by matching, the acuity of each eye may be tested as it is in adults.

HOW IS AMBLYOPIA TREATED?

The treatment depends on the type of amblyopia present. Refractive and some forms of strabismic amblyopia are treated with glasses and/or contact lenses. Some forms of strabismic and deprivation amblyopia are treated with surgery (for example, by removing a cataract). If the amblyopia is only in one eye or much worse in one eye,

amblyopia is treated by encouraging the child to use the weaker eye via patching or eye drops that blur the better-seeing eye.

WHEN SHOULD PATCHING BE USED FOR AMBLYOPIA TREATMENT?

Patching is a very effective way of treating many kinds of amblyopia as it forces the brain to pay attention to the image coming from the weaker eye [See Figure 2]. Patching a young child's better eye is a challenge and requires a lot of effort, persistence and encouragement from caregivers. The younger the child is, the faster patching works in improving the vision, so caregivers should be persistent in patching as soon as it is prescribed. An ophthalmologist should regularly check how the patching is affecting the child's vision.



Fig. 2: Patching the dominant eye allows the weaker eye to get stronger.

ARE THERE DIFFERENT TYPES OF PATCHES?

The classic patch is an adhesive "Band-Aid" which is applied directly to the skin around the eye [See Figure 3]. They are available in different sizes for younger and older children. For children wearing glasses, both cloth and semi-transparent stickers (Bangerter foils) may be placed over or onto the spectacles. "Pirate" patches on elastic bands are especially prone to peeking and are therefore only occasionally appropriate.



Fig. 3: The classic patch is an adhesive "Band-Aid" which is applied directly to the skin around the eye.

IS THERE AN ALTERNATIVE TO PATCHING TO TREAT AMBLYOPIA?

Sometimes the stronger (good) eye can be "penalized" or blurred to help the weaker eye get stronger. Atropine drops will temporarily blur the vision in the good eye and are a great alternative to patching in select cases. The eye drop in the better eye forces the brain to pay attention to the image coming from the weaker eye. For mild to moderate degrees of amblyopia, studies have shown that patching or eye drops may be similarly effective. Your pediatric ophthalmologist will help you select what treatment regimen is best for your child.

DO DROPS WORK FOR ALL AMBLYOPIC CHILDREN?

Not all children benefit from eye drop treatment for amblyopia. Penalizing eye drops (such as atropine) do not work as well when the stronger eye is nearsighted or when the degree of amblyopia is severe.

HOW MANY HOURS PER DAY PATCHING IS ENOUGH WHEN TREATING AMBLYOPIA?

The prescribed number of hours of patching will depend on the visual acuity in the amblyopic eye and whether treatment has been successful in the past. Your doctor will prescribe the appropriate time for you.

HOW LONG DOES AMBLYOPIA PATCHING THERAPY TAKE TO WORK?

Although vision improvement frequently occurs within weeks of beginning patching treatment, optimal results often take many months. Once vision has been improved, less (maintenance) patching or periodic use of atropine eyedrops may be required to keep the vision from slipping or deteriorating. This maintenance treatment may be needed for several months to years.

DURING WHICH ACTIVITIES SHOULD PATCHING BE PERFORMED?

There is no particular activity that will improve the vision more than another activity. The most important part of treatment is keeping the patch on for the prescribed treatment time. As long as the child is conscious and has his or her eyes open, visual input will be processed by the amblyopic eye. On the other hand, the child may be more cooperative or more open to bargaining if patching is performed during certain, favorite activities (such as watching a preferred television program or video). Some eye doctors believe that the performance of near activities (reading, coloring, hand-held computer games) during treatment may be more stimulating to the brain and produce better or more rapid recovery of vision.

SHOULD PATCHING BE PERFORMED DURING SCHOOL HOURS?

In many instances, school is an excellent time to patch, taking advantage of a non-parental authority figure. Patching during school hours gives the class an opportunity to learn valuable lessons about accepting differences between children. While in most instances, children may not need to modify their school activities while patching, sometimes adjustments such as sitting in the front row of the classroom will be necessary. If the patient, teacher, and classmates are educated appropriately, school patching need not be a socially stigmatizing experience. On the other hand, frequently a parental or other family figure may be more vigilant in monitoring patching than is possible in the school setting. Parents should be flexible in choosing when to schedule patching.

WHAT IF MY CHILD REFUSES TO WEAR THE PATCH?

Many children will resist wearing a patch at first. Successful patching may require persistence and plenty of encouragement from family members, teachers, etc. Another way to help is to provide a reward to the child for keeping the patch on for the prescribed time period. Children may also be allowed to do something fun such as watch TV or play video games with the patch on.

WHAT HAPPENS IF AMBLYOPIA IS NOT TREATED?

If amblyopia is not treated in childhood, the vision in the affected eye(s) will be permanently decreased. Our current treatments for amblyopia are not effective in adults.

For most children, the ophthalmologist will give the instructions and monitor the progress, but the patient and the family will do the hard work of actually performing amblyopia treatment by patching, glasses or eye drops.

CAN SURGERY BE PERFORMED TO TREAT AMBLYOPIA?

Surgery is sometimes indicated as part of a treatment plan for amblyopia. Even if they have surgery, children still need monitoring and frequently need other types of amblyopia treatment.

For example, strabismus surgery is often indicated to straighten misaligned eyes such as crossing. Surgery to make the eyes straight helps enable the eyes to work together as a team, but the child still frequently needs glasses or patching. Other surgeries, such as cataract surgery, glaucoma surgery, or retina surgery are also sometimes required as part of a plan to prevent or treat amblyopia.

WHAT ARE APPROPRIATE GOALS OF AMBLYOPIA TREATMENT?

In all cases, the goal is the best possible vision in each eye. While not every child can be improved to 20/20, most can obtain a substantial improvement in vision. The earlier the treatment for amblyopia, the more successful the treatment tends to be.

WHAT HAPPENS IF AMBLYOPIA TREATMENT DOES NOT WORK?

In some cases, treatment for amblyopia may not succeed in substantially improving vision. It is hard to decide to stop treatment, but sometimes it is best for both the child and the family. Children who have amblyopia in one eye and good vision in their other eye can wear safety glasses and sports goggles to protect the normal eye from injury. As long as the good eye stays healthy, these children function normally in nearly all tasks.

In most cases, loss of vision from amblyopia can be prevented or successfully treated if started early enough and if the degree of amblyopia is not extreme. More information about past and ongoing clinical studies regarding amblyopia can be found at the National Eye Institute web site.

More technical information may be found on the [EyeWiki Site](https://eyewiki.aao.org/Amblyopia) »: <https://eyewiki.aao.org/Amblyopia>